

## **WIND FOR SCHOOLS PROJECT AND A ROADMAP FOR DEVELOPMENT OF A WIND WORKFORCE**

**September 2, 2010**

Coordinator: Welcome and thank you for standing by. At this time all participants are in a listen only mode. During the question and answer session please press star 1 on your touchtone phone.

Today's conference is being recorded. If you have any objections you may disconnect at this time.

Now I will turn the meeting over to Ms. Karin Sinclair. Ma'am you may begin.

Karin Sinclair: Thank you. So I think everybody knows me. Karin Sinclair, ASES Small Wind Division co-Chair. And today's webinar is part of a ongoing series that we've had all year long. And this was a topic that was requested by our Small Wind Group. And we of course will - it is being recorded. And it will be posted on our web site at the end.

So today we're fortunate to have Ian Baring-Gould who's from NREL to talk to us about NREL's wind or the Wind for Schools Program.

And just a little background on Ian, he has a Masters in Mechanical Engineering from the University of Massachusetts.

And he's been at NREL since 1995. He focuses on three primary areas, applications, engineering for renewable energy technologies, assistance in renewable energy uses and the educational outreach of renewable energy technologies especially in the area of wind.

He also sits on the IEA Research Task Force looking at wind turbine operation in cold climates and he's an editor for wind engineering. He's co-authored numerous publications. It says here 60. That's quite a few.

And on wind and wind energy and wind diesel power systems he currently leads NREL's Wind Technology Deployment Team focusing on the assisting - focusing on assisting organizations deploying wind technologies and addressing barriers to the implementation of wind energy through the programs like DOE's Wind Powering America Project, the Wind for Schools Activity and Integrated Deployment Programs.

So Ian's going to go through his presentation and then allow for questions as they come up. And the Operator will help us coordinate those questions.

So I'll turn it over to Ian now.

Ian Baring-Gould: Hello everybody. Can people hear me at this point?

Karin Sinclair: Well they can't. They're on mute but yes.

Ian Baring-Gould: Yes, but you can so that's what's important.

Karin Sinclair: Yes.

Ian Baring-Gould: Okay well hi everybody. We have a pretty limited crowd of people here attending the webinar.

But I think Karin brings up a very important point that part of these webinar series is that they are archived and people can go and listen to the

presentations even if they were not able to make the presentation in its first round.

So I'm going to go ahead and go through the presentation and talk primarily about the Wind for Schools Program after a little bit of stage setting. And then I'll talk more specifically about a roadmap that's being developed by the Department of Energy and NREL to really try and look at developing the needed educational infrastructure focused on wind technologies as the nation really moves towards a 20% wind future.

This first slide tries to kind of demonstrate this. The 20% Wind Energy Report is something that's fairly common.

But as we can see it means that we have a long way to go from our kind of current 2% of the U.S. electricity market up to 20% as, you know, the 20% is just a number out there.

But it means that we are going to have to do a lot of implementation of renewable technologies both on the small and large scale. And this is clearly going to require a trained workforce.

And so the work that we are doing both in the Wind for Schools Activity but also in more generally the workforce development space is to try and develop the people and then the infrastructure to be able to take this leap from the 2% to the or the 2% to the 20% which entails in the neighborhood of \$200,000 or 200,000 jobs, employees based on the calculations that were done as part of the 20% report.

Another survey that was done by AWEA really looked at highlighting the kinds of people that we were going to need, that we will need as we - as the

wind industry develops. It's important to note that the data was collected by the industry by AWEA from the industry. But it was collected prior to the recession.

And so it's important to put that caveat on there because clearly the recession has impacted the wind market in many ways and so these numbers - those specific numbers are not necessarily accurate at this point in time.

But I think the trends are still very clear. Certainly the needs for technicians in the wind space both large and small, Project Managers, electrical engineering and engineering sector, business development and then the people that kind of pull all of this together, the support staff in the office and things of that nature.

It does demonstrate a very broad spectrum from employees that have fairly limited skills specifically relating to wind all the way to people that have very detailed skills relating to the wind sector. And that ends up being a pretty large challenge when we start looking at the educational space.

And then we're also looking at fairly large numbers of staff in specific areas like the plant operators, wind techs and people of that nature.

When we look at the wind space we generally speaking break it up into these three groups for education -- the K-12 schools, the kind of community college, Votech Assistance Programs that provide either continuing education to people who are in an industry and want to convert into wind or people that want to build up base levels of knowledge in the wind technology, Apprenticeship Programs and things of that nature fit into this bucket and then the universities and colleges which provide the four year and higher degrees looking at specific fields that in a lot of cases are very specific to the wind technologies themselves, the wind technology or the wind market.

As you can see there's lots of linkages between the different organizations and then federal government sector as well as the industry sector clearly.

And one of the important things to note in looking at this space certainly at this point in time is that the wind industry has put most of its focus into the community college, Votech Program area with Apprenticeship Programs, Union Programs and things of that nature to develop their critical need for wind technicians.

And what this has meant is that DOE with its other partners has really focused its activities at the K-12 and at the university level and so the Wind for Schools Program which I'll talk about first really directs its activities into those two areas, the community college or sorry the K-12 space and then the university space.

And diving into Wind for Schools most specifically, the Wind for Schools Activity is really focused on these three prime areas, the three prime objectives. One is to engage America on the concept that wind offers this alternative. And that's by implementing projects in small communities primarily focused in rural areas where we're putting in the turbines though not exclusively but it's to engage America in the concept of wind and understanding how wind can play a role in energy development within the nation.

Engage schoolteachers and students in energy education with a specific focus on wind. I think all of us would agree that the population's understanding of energy is quite limited. And so working with students at the K-12 level as well as their teachers brings up that level of expertise so that the kids as they grow up understand wind energy much more clearly.

And then finally equip college juniors and seniors in wind energy applications which is again going after this market, this market need for people with experience in wind technologies with a real focus on application of those - of the wind technology.

So even though in a lot of cases we have universities that are doing engineering work part of this is building the better wind turbine, but teaching people specifically how to deploy wind ends up being a critical element in many communities as we look at expanding the installations of wind technologies.

So the general approach is to work with the universities and colleges to train students. And as part of this activity they install site permit and install wind turbines at these K-12 schools.

So the model is for each school in each state to install up to five turbines per year which means that a student going through the Wind Application Center at the university spends sometime installing a turbine each year.

And so it's kind of a renewed hands on experience so that every year there's more turbines to go up and so the new students that come into the program have a chance to work on it in their first year, build on that expertise in the second year and then they graduate and go off either into the private sector or come back for graduate school or something of that nature.

The second big push in regards to the university programs is really to develop these Centers of Excellence within states that have high potential to impact wind development as we go forward. Historically speaking NREL and a few of the other national laboratories and then some private organizations are

really the focal points for understanding about wind energy. And that's great when the industry is small.

But as the industry grows we're going to need many more organizations out there that can support states, state governments, the people in the states in implementing wind technologies and understanding wind technologies.

So we certainly see the Wind for Schools Program and the Wind Application Centers that we put into states as planting seeds for the expanded understanding of wind technologies on a state-by-state basis. And that ends up being one of the critical elements of the Wind Application Centers.

And then the second approach is to assist the community members in implementing these projects, again trying to get five per year in each state and so they're low cost systems, their - so that we can put a lot of them in. They're easy to handle not only from an economic standpoint but also from a co-op and community standpoint. They leverage a lot of the funding and build community kind of development into these small projects and so that you get the communities behind them. And the students get to learn through the implementation of the projects.

Continuing with the approach we work very closely with the K-12 schools to not only have the turbine installed at the school but also to ensure that the curricula and the turbine is brought into the classroom and so we've partnered with a number of the leading educational organizations within the country that are looking at energy education and the NEED Project but also very specific wind education to develop the curricula that is available to K-12 teachers.

We do Teacher Training Workshops. We've developed a specific guidebook associated with the Wind for Schools Project that really tries to actively engage the teachers and the students in the project that's being implemented.

And then that last bullet I think ends up being one of the critical elements of this. The turbine has to be something for the students to use the turbine at the K-12 Level. It has to be something that exists for more than one year.

And so if once you install the turbine at the - on the school the students are very engaged in that project, they help put it in. They feel a lot of ownership with that. But two years later those students have graduated. And a new crop of students are at the K-12 School. And the wind turbine could be a light post outside the front door.

And so the - developing the systems to bring the data from the wind turbine into the classroom and to actively use that data to allow comparisons of the wind turbine in our - at our schools to the one across town to the one across the country to the one across the world allows that rejuvenation of the wind turbine in the front yard of the school so it's not just lawn art but it actually becomes an active learning tool not just the first year but the fifth year and the tenth year.

And that ends up being one of the very critical elements of the program going forward.

We are developing all of the materials so that it can be used very widely and have set up a program so for schools that are interested in doing wind deployment and put a turbine, they can become part of the Wind for Schools Activity. If there is a state that is interested in starting up their own program then they can do that as well.



And so we're really trying to make all of the materials and the concept available to anybody who wants to take hold of it.

Quickly diving into the general process we have three basic areas. We have the federal and laboratory assistance which is driven by Wind Powering America and NREL in Idaho National Laboratories. We have the host schools which are the K-12 Schools and then we have the Wind Application Centers which are represented by the states that we have here. We're currently involved in 11 states at this point in time, 6 of them for quite a few years and 5 of them just recently.

To rehash a little bit but to kind of go over the different roles of the different organizations the wind applications are really designed to be this in-state capability at implementing the project and being the real drivers for it. It's modeled after the DOE's Industrial Application Centers that have been around for about 25 years and very successfully work to improve energy efficiency within states. So it's modeled on that program.

It is really designed as a long term program to teach people about wind energy, have classes in - that include energy but specifically wind energy and then they provide this data analysis, technical implementation support to the K through or to the Wind for Schools Program using the students to get that experience; that hands on experience.

They also - we provide MET Towers to these schools to the WAC so that they can not only learn - the students cannot only learn how to install and analyze data from a MET Tower but also not every potential host school site is going to have a good wind resource so it allows to kind of put a MET Tower as a

first stage to the development processing schools that don't necessarily have a great wind resource.

We have as part of this program we have state facilitators. So we hire the people at the Wind Application Center, a professor typically to implement at that end. But as we know professors are not necessarily the ones that are best in getting out and working with communities, understanding what the communities need.

And so as part of the Wind for Schools model we also hire someone who we term as a facilitator but who goes out and facilitates the projects and builds the bridge between the K-12 host schools and the university. They're also charged with making sure that the education materials are being implemented in the school and do that kind of front office integration work that the professors are not necessarily very good at. Some are great, some aren't but it's certainly not the strong point of most university professors. No offense to the university professors out there.

And then the host schools, so the host schools we install a turbine at their property and they assist in that implementation process, location of the turbine, obtaining the support within the School Board, local zoning, working with the students to get those kinds of approvals. Then once the turbines or as the turbines are being installed we hold Teacher Training Workshops so that the teachers can get the curricula they need and Kid Wind has developed to bring that back to the classroom and then teach about wind based on the data you get from the turbines and the other turbines that are out there.

We currently as of today we have about 50 systems installed with a bunch more in progress. And most of those are from the kind of the original six states with the other states just coming online now.

And then we also provide a fair amount of programmatic support here through the laboratory structure. We provide initial C funding to the Wind Application Centers and the state facilitators with the vision that they become self-sufficient over a number of years.

And one of the kind of program elements that we try to stress is that the DOE dollars are not an unending stream of funding for this project but are the money - is the money that we use to kick this off and everything we do tries to implement over a number of years this - the ability of the organizations to do self-funding.

We host yearly trainings on wind energy applications. We support the development of the curricula not only at the K-12 Level but also at the university level.

We supply a bunch of the equipment, the MET Towers as needed. We assist in the identification of candidate schools and help in the resource assessment and things like that as needed for the Wind Application Centers to provide that technical expertise.

And then we also fund the Teacher Training Workshops or a large portion of the Teacher Training Workshops.

So we've had a number of - a fair amount of progress thus far in the areas that we really are focused on. One is training with students so with the six active states we have hundreds of students that have been involved in the program either helping to install turbines or taking classes in wind energy. We also have as I said a bunch of turbines installed at schools which have impacted thousands of K-12 students through the process.

And then we also have this Auxiliary Wind for Schools Program in place which is the one that allows schools that are not in the states that we're currently active or host states to become involved in the project if they choose to.

We can put up those numbers but I think it's probably more important to hear what other people say about the program. And so I'm going to play here a few, or not play but show a few quotes from different people that have interacted with the program to give you an idea of what other people think about it because I could talk about it all day but that doesn't necessarily convince you that it's great.

So this is Senator Thune of South Dakota talking about it in his state, some very nice words.

The Governor of Montana as you get tomorrow's leaders on the value and importance of this renewable energy resource, again very strong words. We actually had him. He's attended a couple of the installation projects at the host schools shoveling dirt himself so he's a very strong supporter.

Here's a guidance counselor at Wellington Middle School here in Colorado. An awesome program and they have taken the one wind turbine that they have installed and are building it into an energy park including solar and other renewable technologies to kind of demonstrate Wellington as a potential magnet school for energy.

From Kansas they installed one of the turbines at a place called Greenbush which is an Education Science Center that serves a bunch of schools so instead of schools in Kansas having very detailed science curricula they build

these Science Centers that then draw students from dozens of local K-12 Schools.

And so in this case we've had thousands of students come to this Greenbush Science Center and spend a couple of days working with different technologies and the education on wind is one of the strong ones that draws a lot of students to the Resource Center.

Here's a principal talking about how impactful it is to have students play with something that's real. They spend a lot of time with textbooks but once they get a chance to actually play with data, play with model turbines, experience things upfront it means a whole lot more to the students.

Senator from Nebraska, Senator Nelson setting the stage for growth by educating future generations and the importance of energy; and then finally our Governor from Colorado who uses the Wind for Schools example whenever he's out on the speech trail talking about his energy activities within the state and highlights Wind for Schools as one of the achievements.

So clearly we get a fair amount of interest and a fair amount of publicity from different people at fairly high levels who agree the program really works.

I'm going to delve a little bit more into the structure of the program and who we're really trying to teach as we go forward here. We have this kind of then diagram of the organizations that take part in the Wind for Schools Activity. Clearly we have the school in the center and the science teachers, administration and the community which are the local people that we're trying to impact by educating them about wind technologies.

We have the support network that DOE has put in - DOE and NREL have put in place to support Wind for Schools and that includes the facilitator, the Wind Application Center, NREL and the WPA Program, DOE and then also the state energy offices, all of these organizations are there to support the teacher and the local community with either technical assistance or dollars or what have you.

And then last but not least we have the funding structure that supports the actual implementation of each of the host school projects, funding for the project through renewable energy grants with turbine manufacturers, sponsoring companies.

And then a very strong element is the co-op and local utility that ends up supporting the project in almost every case. The light bulbs kind of demonstrate the organizations or the people that we're trying to impact through knowledge about wind technologies. And I think that kind of covers the gamut.

The power system that we typically use is a small Skystream turbine. And I'll get into that a little bit later.

But it's a relatively simple turbine or simple system, small wind turbine on a relatively small tower. Here we talk about a 70-foot guide but in almost every case we end up going with a 45 or a 60-foot amount of pole just because it's a simpler design, cleaner. Costs a little bit more but the schools seem to like it. And it hooks right into the electrical system of the school so a very clean and easy implementation which is one of the benefits.

The project costs about \$20,000 for a turnkey though in almost every case we're getting a lot of the equipment, not the equipment but a lot of the support

infrastructure donated. Not uncommon, actually it's very common to have the local utility provide the bucket trucks, to do all the trenching and things of that nature to support the implementation of the projects at the schools.

So in reality we're looking at raising in the order of 10 to 13K for the implementation of each project. And that's a responsibility that is borne primarily by the facilitator and the people at the Wind Application Center through grant writing and things of that nature. No DOE funding goes into the actual installation of the host school turbines.

And one of the main reasons for that is again DOE is not the ultimate source of dollars here and we want to make sure that this is a program that can continue even after DOE goes away or loses interest.

But also once DOE buys a piece of equipment it owns the piece of equipment and the last thing we want to do is come around in a few years and rip up all these turbines out of the ground.

So the turbine, the cost of each host school installation is borne by people within that state. We get the school to put in a little bit of money and that demonstrates their commitment to the process. We have a donation for the green certificates of the program.

And then we use many different sources of local funding to support the project and every state has a different approach to how they raise the funding. Some use state grants, others have used USDA. Some have some benefit charges. Some have nothing and they go out and raise the money from local industry.

But generally speaking even though \$10,000 may seem like a lot of money we really have had only one or two examples of the 50 systems that we've looked at where money has been a significant issue and has kept the project from going in.

So generally speaking once you start beating the bushes money kind of is - drops out. A lot of that I'm sure has to do with rural communities and schools. There's a lot of goodwill towards those two entities.

The system really is not designed to pay back even though it does for the school if you look solely at the school's investment. But it is and should be really considered as an educational tool and that's what we bill it as.

As I mentioned we develop a lot of or supported the development of a lot of curricula primarily through the NEED Project but also through Kid Wind and Wind Wise and that includes sending teachers from the states to the Wind Senator Series that is hosted by Kid Wind.

I mentioned already bringing the turbine into the classroom and the importance of this data stream to allow not only the students to experience the turbine year after year but it plays very strongly into the required standards for every educational institution here in the United States. And that is dealing with science and math in kind of hands on and active ways. At no point can you get away with showing up with some neat curricula and handing it to a teacher and expecting them to use it unless it is all brought back to state and national science educational standards including science.

So the ability of this data to be harnessed from the wind turbine allows the teachers to incorporate that into the classroom in a standards- based way and



the fact that the data comes from the turbine that's right outside the door engages the student in that process. And that ends up being very important.

Idaho National Laboratories has developed a database that allows teachers and students to access data from any of the Wind for Schools turbines across the country. And or all the ones that are part of the data package.

And so you have that ability to look at not only your school but the school across town, the school across the state, the school across the nation and do comparisons with the different turbines, different tower heights and all that kind of stuff. It ends up being fairly important as we go forward and teaching.

I talked a little bit about the Auxiliary Program but it is in place to allow other schools or programs that are interested in being part to be actively engaged in the Wind for Schools process without having to be one of the 11 states or the Skystream turbine at this point in time.

The proposed next steps as we go forward is continuing to grow the program, eventually having the six original states become self-sufficient in which case we'll expand to additional schools or to additional states and additional schools.

Moving into a little bit about the larger education initiatives that is happening within DOE and NREL and then we'll wrap it up with questions, here taking a little bit of a step back, this kind of identifies the challenge that we have when we look at a wind educational infrastructure.

If you look at some of the other technologies out there that we get our energy from, mineral extraction, nuclear power, things of that nature, we're talking about very, very developed educational infrastructures for these organizations.

Colorado School of Mines just down the road from us in Colorado is a perfect example. They've been operating as an educational institute for well over 100 years. We're getting close to 150 years now.

And if wind technology is going to become a mainstream of the energy infrastructure in the United States we are going to have to develop this energy infrastructure or this educational infrastructure and its something that we do not have right now.

We also have to go against differing kind of opinions or not opinions but differing assumptions of the federal roles of the program, of different programs. As an example DOE provides upwards of \$10 million specifically at the university level in nuclear power. In addition to large sums of money the military puts into training nuclear engineers. We do not see that type of infrastructure being put in place by DOE, DOD or any other organization into the renewable sector especially the wind sector. And so we have to overcome those hurdles as we go forward.

And then I think we need to put it in the right context in regards to the energy sector and that's aging population of people that have experience in energy and are engaged in the industry. We have a markedly downward trend in regards to the students that are entering engineering professions. We have an overly male dominated industry and the only place we see growth in the - in people coming into the educational sector is primarily women and minorities and the wind industry. If we hope to have the people that we need to support an expanded wind industry we have to be thinking very forwardly with forward thinking in regards to how do we engage these new people in the wind space so that we have the people that we need to make the industry successful as we go forward.

To this end we've developed a roadmap or are in the process of developing a roadmap that will try to identify the needs for the wind industry as we go forward.

Currently there is not such a document. It does build out of the 20% report in that the educational infrastructure was highlighted as one of the key challenges.

And so DOE in partnership with NREL and AWEA have taken on some of those challenges and are developing roadmaps to work on addressing them. And so this document is doing exactly that.

We've kind of identified the stakeholders here. Certainly industry, educational industries, support organizations like AWEA and then also the federal sector as being the key stakeholders in making this go forward.

And the desired outcomes are going to be no surprise to anybody. It's individuals who are - who have the required training and skills to support the wind industry. Training opportunities to allow existing staff to improve their knowledge and enhance a sustainable energy education that marks to the green economy.

Define pathways so that people at the K-12 Level know that there's actually an industry out there and how they - if they want to become a wind technician they can actually figure out what they need to do to become a wind technician. Have the trained instructors to be able to do that training at the community college and university and industry level, as I mentioned, the expanded inclusion of women and minorities in the wind industry and then engagement of the educational sectors in the expanded sense of the word.

And so just to drill down a little bit more in this area talking about the kind of main professions that have been identified windsmiths, personnel in the operation and maintenance of turbines, construction implementation, manufacturing, business experts, engineering, other wind application experts the scientists, resource assessment people and then researchers.

And I think what this highlights is that we're not talking about just setting up a bunch of engineering schools to look at wind technologies. That's not a solution.

And so we have to think very broadly in regards to the energy education infrastructure that needs to be put in place. It's also very important to note that there are differing timelines for the training of each one of these people. A Windsmith Program can be two years even though it can be fast tracked for a couple of months.

But if we're going to develop a PhD in resource assessment let alone a professor in resource assessment that's anywhere from an 8 to a 20 year process and so if we want to have the - those kind of resources that we need going into the future we really have to start working on them now and understand that different time horizon.

So I identify a number or in the document we identify a number of the critical needs from a general perspective. The challenges that industry has defined as well as ones that are common to each of the three educational sectors that I introduced previously, the K-12, community college and university level.

But better standards; develop a better defined career ladder and then strong alignment with academia. Looking at the different sectors and specific at the

primary K-12 understanding and marketing of existing curricula and materials so that people know what's out there, engagement with the wind industry, collection and technical review of the different documents out there. I won't go through each one of these in specific but a fairly substantial list of critical needs at the K-12 Level.

Again at the community college level we have defined those activities quite specifically through very active engagement with people at the community college level. Some of the key ones is support program development because wind industry is especially when you're training, wind technicians they need equipment to be able to train on and that can be upwards of a \$5 million investment just in the equipment to launch a new program and that's certainly not something that a community college has easy access to.

Another big area is the opportunities for teachers and staff especially if you're a wind technician then you can get almost twice the salary by being out on a wind farm as compared to being a community college teacher. There's a lot of motivation not only for - to get people out. For industry to come into community colleges and steal, it's probably a wrong word, but take teachers. And we've actually seen that quite actively in this space now. All of the original community colleges that started up teaching wind technicians, all of the senior staff are now with industry and I'm sure getting paid a whole lot more when they were a professor at a community college.

University sector another whole series of challenges, critical needs that need to be addressed, the better defining of the skills, expanding the curricula, the development of the programs, lots of different things that we can do to improve the university sector.

Here's a copy. Provide a copy of the roadmap as well as a web address that allows you to download the draft version of the document. And I list the specific contents that we find. Kind of goes over the history, some of the things that I've already talked about here about the needs of the wind industry, identifies all of the challenges and provides recommendations for potential solutions. And then provides a list of current programs that we were able to collect that are out there.

A number of steps, we've had an official request for information that was released by DOE right after wind power that has subsequently closed but we're still taking comments directly from people within the industry in regards to the draft roadmap. We're expecting to update that and then circulate that with the industry sector, AWEA and others as well as the educational sector to get kind of a final expert review of the document before we release it in - planned now in the late spring.

So that's a quick overview of the road mapping effort that we have underway to really address the kind of the bigger picture that goes beyond simply what the Wind for Schools Program is trying to achieve.

Karin Sinclair: So I think at this point you want to open it up for questions.

Ian Baring-Gould: Of course.

Karin Sinclair: Yes, okay.

Coordinator: Thank you. If you'd like to ask a question over the telephone please press star 1. Again that is star 1 to ask a question over the telephone.

One moment please.

Once again if you'd like to ask a question, please press star 1 at this time; one moment for the first question.

Our first question comes from (Michael Kuze). Your line is open.

(Michael Kuze): Yes, hello. Glad you guys could put this program on. I'm in the mountains of North Carolina and trying to implement an education process to the general public here in this area and would love to join in with your process in the Wind for Schools.

I don't really have a question. I just applaud you on what you're doing and would love to be a part of it.

Ian Baring-Gould: Well thank you very much. Appalachian State is probably the school in the area that I would get in touch with. So you can certainly contact me without question about how you can become involved or talking to Scanlon about how you could play a role I think would be very appropriate.

(Michael Kuze): Yes, I know Dennis Scanlon and actually got my education in renewables from ASU.

Ian Baring-Gould: Perfect.

(Michael Kuze): Yes, so he would be the man.

Ian Baring-Gould: He would be the man. They're just starting. They're one of the new states that we just brought in this year and I'm not even sure if the ink on their contract is dry yet so.

(Michael Kuze): Right.

Ian Baring-Gould: They've been very active in the wind space as we all know and are just starting to launch their Wind for Schools Program in that area.

(Michael Kuze): Well very good Ian. Thank you again for your time.

Ian Baring-Gould: Oh my pleasure.

(Michael Kuze): Bye.

Coordinator: Once again if you'd like to ask a question please press star 1; one moment for the next question.

Next question comes from (Aaron Godwin). Your line is open.

(Aaron Godwin): Hello. This is (Aaron). I'm excited about seeing the program continuing to develop. I think we touched base in the past.

And my question just has to do with supporting projects within Ohio and our region. I guess we weren't one of the states that was in the program before.

And then I also have a question about the size of projects. We're actually working quite diligently in the midsized wind market for schools so true economic benefit, (2.25) to 1 Megawatt projects. But we have done Skystreams as well but we're really focused on trying to get true economic return in the district.

Ian Baring-Gould: Yes. And I think that ends up being an important, a couple of important issues. I mean we're certainly supportive of other technologies and larger



turbines. We chose to stick on the small side just because of the headaches of being able to implement it. When we first piloted the program here in Colorado we started off opening it up to basically every turbine that was potentially out there.

And what we ended up getting was paralysis at the K-12 school level because it was too much information for the administrators to wrap their brains around. And we didn't really have the funding available to kind of go through the larger efforts of implementing larger turbine projects.

But we're certainly supportive of that and we certainly hope that the implementation of the smaller turbine at a school will lead to the implementation of the larger turbines either at that school or within the community themselves once we get the kind of the nose, the camel nose under the tent as it were.

For - I also want to be really clear that other size turbines can certainly be part of the program. So if Michigan has put in a bunch of - if you've put in a bunch of northerns and other technology as well that we're more than happy and actually encouraging those schools to become part of the Wind for Schools network. And the only real requirement that we have as part of that is that they make the data for their turbine available to the Wind for Schools network and therefore all of the other schools get to take advantage of that data and it just improves the educational experience for everybody because not only do you have a bunch of small turbines out there but you have a bunch of big turbines too.

And you could certainly see a student who had their Skystream turbine looking at the data from another turbine across the state or something and

walking into their principal's office and saying hey why don't we have one of those big ones? Look what it could do for our school if we wanted to do that.

And so that's certainly part of the motivation. Along those lines we do allow other turbines to become part of the network and we kind of settled on the Skystream at least initially because of its ease and its online data capabilities.

But any other turbines that are out there that can provide data to the grid and are relatively easy to install are more than welcome to be part of the program. And we certainly don't dictate that from the federal perspective.

I think I answered all your questions (Aaron) but not 100% sure.

(Aaron Godwin): Yes. Just it would be nice to have a program developed and we're - trust me, we fully understand how difficult it is to make things happen at schools.

But it really does get to the fact that these can do more than just the, you know, billboards or, you know, toys that they can really actually, you know, off of tax dollars and really offer platforms for the much bigger picture which is, you know, training platforms for local community colleges where they can't afford them.

Ian Baring-Gould: Yes. No. And I think that's a good point. And it's something that's been kind of on our radar screen that we really have not pushed it is working to set the Wind Application Centers up as kind of mini deployment organizations, again not trying to compete with local industry but supporting not only the small turbines but also the large turbines and the implementation of large turbines at other entities for the exact economic reasons that you talk about. It's in part of the model for getting the Wind Application Centers self-sufficient.

But I agree completely that we haven't done enough to kind of prep them for that process which would include developing documents and documentation about some of these case studies like the Michigan - the ones in Michigan where schools - what other schools have done and where it makes sense and why it makes sense to implement larger projects. I think that would be very valuable.

Coordinator: Our next question comes from (Carol Wolfendorf). Your line is open.

(Carol Wolfendorf): Hi Ian. This is (Carol). I'm - I appreciated your mention of the wind resource assessment and the type of training that requires to get students and/or faculty up to speed on that.

I'm always looking for, you know, potential peers and collaborators, you know, sort of in the academic world. And wondered if you could mention any of those and also just wondering if there are any focused efforts toward wind resource assessment which doesn't necessarily require an entire turbine. But it does require a tower and anemometers.

Ian Baring-Gould: The first part of your question, well hi (Carol) first.

(Carol Wolfendorf): Hi.

Ian Baring-Gould: The first part of your question I don't really have anything to add. I'm not sure of any university programs or educational programs at large that focus specifically on wind resource assessment though I'm sure there are some out there.

And I know that it is larger parts of different programs. Texas Tech clearly has their (tall) tower stuff that has a large resource assessment component.

UMASS has a lot of resource assessment as part of their work so there certainly are ones out there that are trying to push the envelope. But nothing like - well Texas Tech might be the only example of ones that have kind of doctorates or something of that nature that focus in wind dynamics and wind resource dynamics.

(Carol Wolfendorf): Yes.

Ian Baring-Gould: In regards to the second part of your question the provision of the MET Towers for the schools tries to get at some of that. And some of the curricula is kind of specifically related to analyzing data associated with wind resource and MET analysis.

So we are incorporating some of that into the curricula that we're developing and have developed for the K-12 space as well as at the university. We have worked with windographer to develop. They're developing a special Wind for Schools element for windographer and this is all done completely by themselves as well as special discounting to Wind for School schools and things of that nature so that wind resource assessment is a big element of the university educational process.

(Carol Wolfendorf): So what educational materials are they using beyond the NREL guide, the 1997 guide?

Ian Baring-Gould: The - it's just at the K-12 Level there is specific lesson plans related to wind resource.

(Carol Wolfendorf): Are these on Kind Wind or (unintelligible)?

((Crosstalk))

Ian Baring-Gould: They're on...

((Crosstalk))

(Carol Wolfendorf): (Unintelligible).

Ian Baring-Gould: They're on NEED Project and then also the Wind Wise curricula has some specific stuff associated with wind resource assessment.

And then at the university level we have not developed specific university level curricula. But we haven't done that in any of the technology fields just because it's usually very professor driven and the books that almost everybody using is the Wind Engineering Book that Manwell and McGowan wrote from UMASS. And that's the - if there's a text that is being used in these wind classes at the university level that's typically it.

(Carol Wolfendorf): Well or Wind Characteristics but it's out of print.

Ian Baring-Gould: Yes.

(Carol Wolfendorf): Thanks.

Ian Baring-Gould: No, my pleasure.

Coordinator: Once again to ask a question please press star 1; one moment.

At this time there are no other questions.

Ian Baring-Gould: Great.

Karin Sinclair: Well I think that was a really excellent presentation and I'm glad that it'll be available online so those who weren't able to make it today can pull it up if they're interested.

And I want to thank Ian for providing that presentation for us.

I want to remind the - our members that we do have one more webinar later this year in November and the topic will be the Economics of Small Wind and we'll send out an announcement on that probably next month.

And I guess if there are no additional questions I want to thank everybody who was able to be on the call. And we'll talk to everybody soon.

Ian Baring-Gould: Thank you all.

Karin Sinclair: Bye.

Ian Baring-Gould: Bye-bye.

Coordinator: Thank you for your participation. You may disconnect at this time.

END